122281

Ex Parte Meeting

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Docket NHTSA-2000-8572 -10

On February 1, 2001, NHTSA representatives met with representatives of Bosch Braking Systems concerning the impending rulemaking on tire pressure monitoring systems required by the recently-enacted Transportation Recall Enhancement Accountability and Documentation (TREAD) Act.

NHTSA was represented by Dion Casey, Katherine McDonough, Nancy Bell, Bruce C. Spinney, Joe Scott, Art Carter, Jonathan Walker, Steve Peirce, Larry Blincoe, and Joseph Kanianthra. Bosch was represented by David M. Cummings and Matthias Leiblein.

The Bosch representatives presented their view of what the rule on tire pressure monitoring systems should entail. That presentation is attached.

BOSCH	Tire Inflation Monitoring System Statement	0 204 Y82 118

AC/ESC2
AC/ESC1
AN/ESC Library

Cover Page:
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AC/EAC2
AC/EAC4

Customer : All

System : TIMS

Vehicle : All

Changes:

No.	Date	Description	Page	Signature
1.0	1/31/01	Original Draft.	All	

File: *TIMS - Bosch Statement.doc*

Department	Date	Signature
AC/ESC2		
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"Normal tire maintenance procedures must be followed regardless of whether a Tire Inflation Monitoring System is used or not. Especially, tire pressure adjustments must be performed even in the absence of any signal in order to maintain optimum tire performance. TIMS is only an aid for the decision to take corrective actions in the case where a tire pressure decrease has not previously been detected and compensated by a pressure adjustment or repair."

1. SYSTEM DESIGN PHILOSOPHY

1.1. SYSTEM RESPONSIBILITY

Overall responsibility for tire maintenance remains with the driver. The Tire Inflation Monitoring System (**TIMS**) is an aid for the decision to take corrective actions.

> **"Normal tire maintenance procedures must be followed regardless of whether a Tire Inflation Monitoring System is used or not. Especially, tire pressure adjustments must be performed even in the absence of any signal in order to maintain optimum tire performance. TIMS is only an aid for the decision to take corrective actions in the case where a tire pressure decrease has not previously been detected and compensated by a pressure adjustment or repair."**

TIMS is **not a safety system**. Any tire safety system would be one that would *maintain* tire operation at a safe level in the event of an underinflation or failure. TIMS does not do this.

NOTE: In the hypothetical circumstance of TIMS being viewed as a safety system, there would presumably be significant impacts on:

- *System Design Standards*. Human factors implications, indicator test procedures, hardware self-test and diagnostics, electrical/mechanical system reliability and failure modes, lifetime, accuracy, etc.
- *Consumer education.* As consumers come to rely on TIMS to keep tires properly inflated, the distinction must be made clear that TIMS will warn of a significant underinflation, but tires must be maintained at recommended pressure for optimum vehicle performance.
- *Vehicle maintenance.* Consumers could become reliant on the system, which makes it crucial that replacement tires on the vehicle are correctly sized. Tires which are too large are not a problem, but for tires that are too small, safety margins would dwindle quickly and warnings would come late.

1.2. MONITORING VS. MEASURING SYSTEMS

As the name explicitly states, TIMS is a monitoring system and not a measuring system. TIMS monitors the tire operation and performs an analysis of that operation with respect to established thresholds. This is different from a measuring system in that the latter measures the pressure condition and does not monitor the tire operation.

2. RECOMMENDED SYSTEM INFLATION LIMITS

For optimal tire performance, a vehicle's tires should be maintained at the OEM recommended cold pressure (placard). TIMS inflation limits must be defined, however, not by the OEM placard pressure, but instead by tire performance standards (especially load-inflation tables) as defined in publications by the following standardizing bodies:

The Tire and Rim Association, Inc.
The European Tyre and Rim Technical Organisation
Japan Automobile Tire Manufacturers' Association, Inc.

Underinflation shall be defined as *"any pressure that is below the minimum pressure required to carry the tire's load in the current operating condition"*. The current Federal Motor Vehicle Safety Standard 109[1] refers to the above tire standards as well. The governmental tire regulations require endurance testing at 50 miles per hour to the "maximum load rating marked on the tire sidewall"[2], and high speed testing to 85 miles per hour at 88% of the "maximum load rating marked on the tire sidewall"[3]. Tire operation within the testing limits defined by both FMVSS 109 and the tire standardizing bodies shall not be considered *underinflation*.

Significant underinflation shall be defined as *"any pressure that is **15%** or more below the minimum pressure required to carry the tire's load in the current operating condition, or **120 kPa inflation pressure**, whichever is greater"*. This is the point where there is considered to be a significantly elevated risk level for tire failure.

Severe underinflation shall be defined as *"any pressure that is **35%** or more below the minimum pressure required to carry the tire's load in the current operating condition, or **120 kPa inflation pressure**, whichever is greater"*. This is the point where there is considered to be a severely elevated risk level for tire failure.

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[1] **§ 571.109** (FMVSS 109)

[2] **§ 571.109**, S5.4

[3] **§ 571.109**, S5.5

In the absence of accurate load, speed, temperature and surface data for a tire, the tire shall be assumed to be operating (respectively) under the *vehicle maximum load on the tire*[4], at the tire's rated speed (or vehicle maximum, whichever is limiting), at 45°C ambient, and on a smooth level road surface. These conditions are application specific "worst case" for deflation-induced tire failure.

For improved consumer safety to be realized, the standardization of TIMS must not lead to more aggressive design criteria with respect to the standardized load-inflation tables – i.e., this must not lead to GVW design loads becoming closer to the tire load limits than current practice. Reduced risk of tire damage must not be compensated by reducing the safety margin (risk compensation) in the tire selection relative to vehicle GVW.

3. TIMS PERFORMANCE

This section sets forth guidelines for which the tire inflation pressure system shall operate as a whole and recommendations for interface to the vehicle operator as to the status of the tire monitoring system or inferred inflation of the tires.

3.1. SYSTEM INDICATORS

Use of the recommended ISO symbol is required when indicating a visual status of the system. Additionally, text and or numeric values may be used. Color shall be *yellow*. The recommended ISO symbol has not yet been approved, so a different symbol or text warning may be used until one is defined.

The intent of the system is to advise the driver of a potentially unsafe tire operating condition, but the responsibility lies with the driver to find a safe place to pull over and perform maintenance. The spirit of the lamp is similar to the yellow *"Check Engine"* lamp because vehicle performance may be inhibited or become unsafe, but it is the decision of the driver when and where to perform the inspection.

3.2. DYNAMIC RESPONSE

The TIMS shall alert the vehicle operator within a specified time period when not meeting the tire inflation requirements.

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[4] **§ 571.110** (FMVSS 110), S3.

3.2.1. Blowout

The warning in this situation is a technicality since the tire has already failed and a warning will not aid the driver. System response shall be the same as a severe underinflation.

3.2.2. Significant Underinflation

In straight smooth driving conditions, a warning lamp is required within ***5 minutes*** of a significant underinflation.

3.2.3. Severe Underinflation

In straight smooth driving conditions, a warning lamp is required within ***3 minutes*** of a severe underinflation.

3.2.4. Multiple Deflations

The system is designed for detection of a single significant underinflation. Multiple deflations (i.e., multiple simultaneous tire failures on a single vehicle) shall be treated, in FMEA terms, as a "multiple failure".

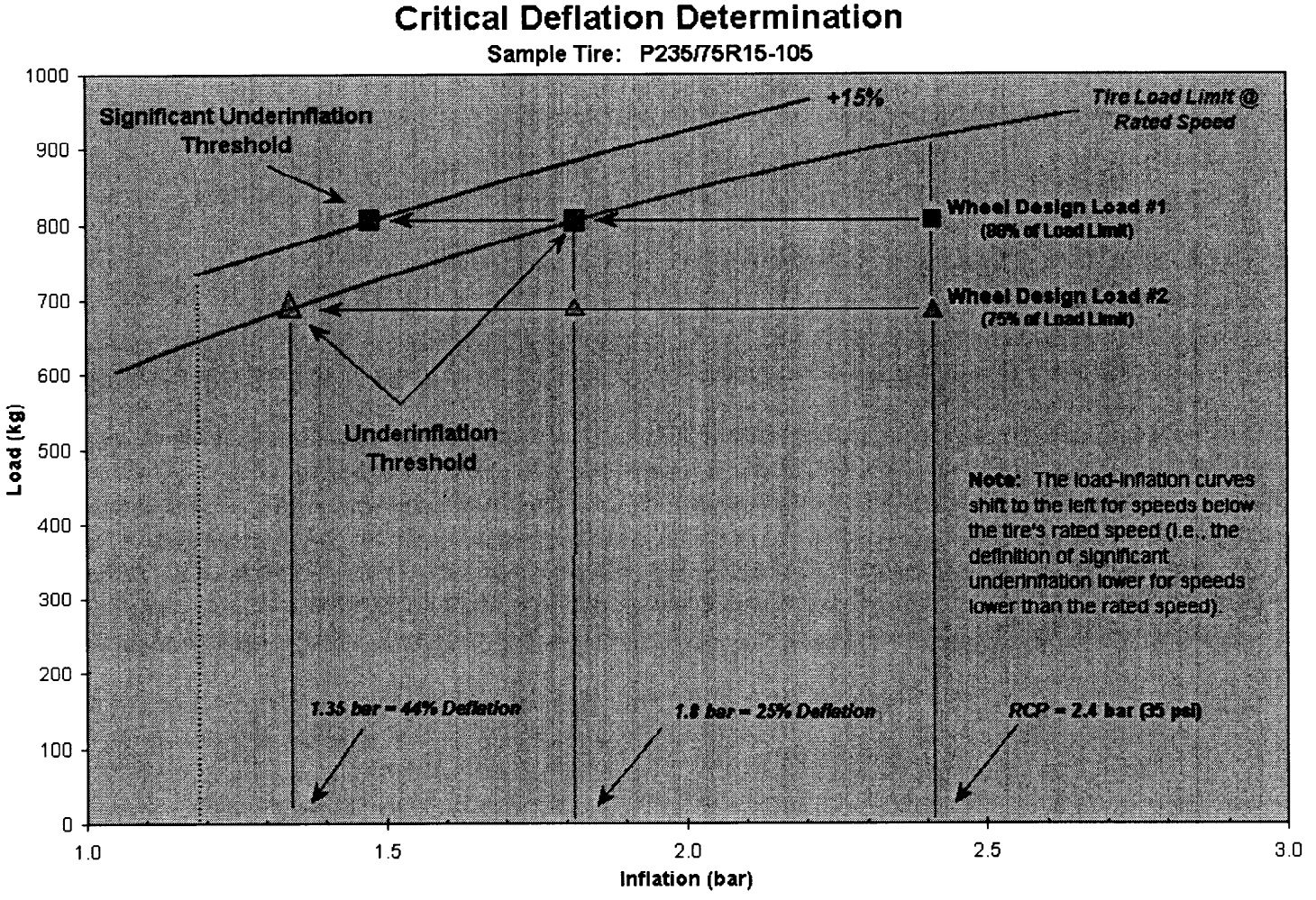
Note: Modern vehicles are equipped with only a single spare tire. The occurrence of multiple tire failures is presumed to be very small.

3.3. SPARE TIRE FUNCTIONALITY

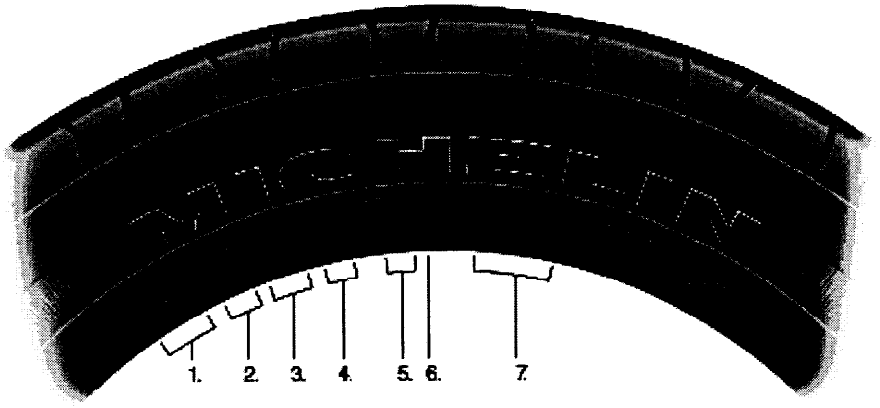
In the case of a full size spare, the system shall be reset as required (following provided reset instructions), and driven as normal.

In the case of a "mini-spare" for which tire properties are significantly different, thus limiting vehicle performance, the warning lamp shall remain on to advise the driver of this situation. A reset may be initiated as required upon removal of the "mini-spare".

APPENDIX A – CRITICAL DEFLATION DETERMINATION CHART



APPENDIX B – TIRE SPEED RATING CHARTS



1. 205 - Width of the tire in millimeters.
2. 55 - Aspect ratio (this sidewall's height is roughly 55% of the tire width).
3. R - For Radial construction.
4. 16 - Diameter of the wheel (in inches) on which the tire fits.
5. 88 - Numerical code associated with the maximum load a tire can carry.
6. V - Speed rating (this tire could sustain speeds up to 149 mph).
7. XGT V - Manufacturer's name for tread design and architecture.

NOTE:
Some size designations may be preceded by a "P," signifying Passenger.

N=87 MPH, 140km/h

P=93 MPH, 150km/h

Q=99 MPH, 160km/h

R=106 MPH, 170km/h

S=112 MPH, 180km/h

T=118 MPH, 190km/h

U=124 MPH, 200km/h

H=130 MPH, 210km/h

V=149 MPH, 240km/h

W=168 MPH, 270km/h

Y=186 MPH, 300km/h

Z=149 MPH, 240km/h and over

APPENDIX C – HOUSE RESOLUTION 5164: THE TREAD ACT

106th CONGRESS

2d Session

H. R. 5164

AN ACT

To amend title 49, United States Code, to require reports concerning defects in motor vehicles or tires or other motor vehicle equipment in foreign countries, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the `Transportation Recall Enhancement, Accountability, and Documentation (TREAD) Act'.

...

SEC. 13. TIRE PRESSURE WARNING.

Not later than 1 year after the date of the enactment of this Act, the Secretary of Transportation shall complete a rulemaking for a regulation to require a warning system in new motor vehicles to indicate to the operator when a tire is significantly under inflated. Such requirement shall become effective not later than 2 years after the date of the completion of such rulemaking.

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Bosch Braking Systems
TIMS Presentation to NHTSA

BOSCH

Presentation to the

National Highway Transportation
Safety Administration

Tire Inflation Monitoring Systems
HR 5164 (TREAD Act)

February 1, 2001
1:30-3:30pm
Nassif Building
Washington DC

Rainstorm in Death Valley NP, CA

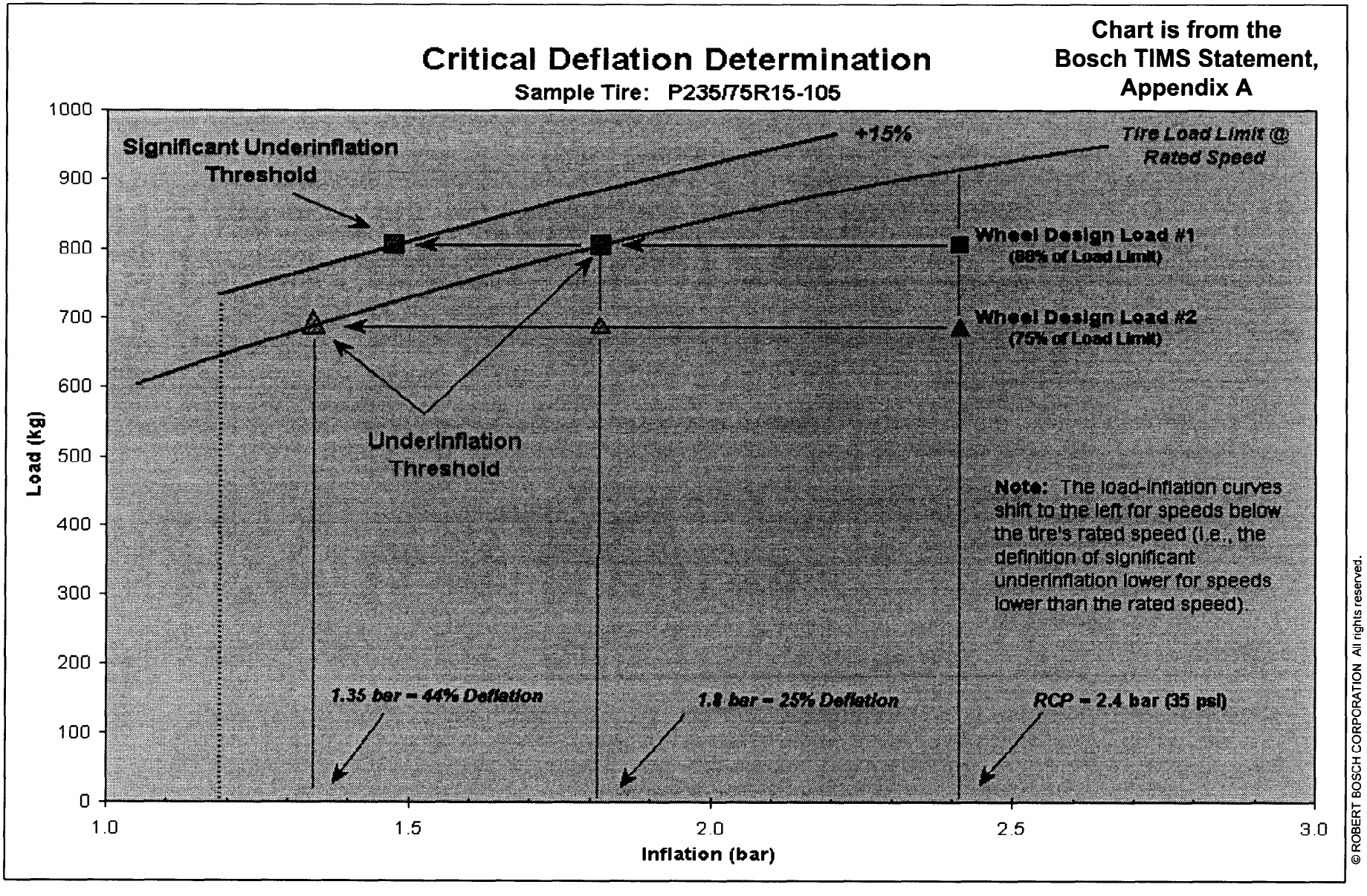
Bosch Braking Systems
TIMS Presentation to NHTSA

- Agenda
  - Introductions
    - Bosch
  - Presentation of the Bosch TIMS Statement
    - Attached statement
  - Bosch Response to Received NHTSA Questions
  - Open Questions
  - Rulemaking Update
    - Expected Schedule

Bosch Braking Systems
TIMS Presentation to NHTSA

- Bosch Braking Systems
  - Tier 1 supplier of total braking systems
  - Safety system experience.
    - Anti-lock Braking System (ABS)
    - Electronic Stability Program(ESP).
  - Wheel-speed based TIMS Experience
    - 5+ years development
    - Death Valley, High Altitude, and Cold Weather Testing
    - Bosch TIMS entered production in 1998
  - TIMS Development
    - Typical program tuning involves 5,000 miles of actual driving on actual roads, 200,000 miles of simulation, then 3,000 miles of validation, all followed by high mileage fleet testing.

Bosch Braking Systems
TIMS Presentation to NHTSA



Bosch Braking Systems
TIMS Presentation to NHTSA

- Temperature Compensation.
  - Bosch recommends that NHTSA **not** require TIMS temperature compensation.
    - Rulemaking thresholds should be based upon tire design.
    - A temperature decrease that causes a drop in tire pressure below "that pressure required to carry the load" is inherently not a nuisance detection.
    - NHTSA should **not** require temperature compensation because the only benefit is to avoid the "nuisance detections" caused by temperature changes.
  - Temperature compensation could be implemented in the realization of a TIMS system, but the feature should not be mandated as a minimum performance requirement. This feature, as with many others, should remain market- and application-driven.

Bosch Braking Systems
TIMS Presentation to NHTSA

- Human Factors & Resetting Functions
  - TIMS resetting should be simple and self explanatory.
  - TIMS should re-calibrate and return to normal monitoring operation in a reasonable period of time, and with a minimal driving schedule.
  - TIMS resetting should become a normal part of tire maintenance.
    - Reset after:
      - Tire replacement.
      - Tire rotation.
      - Tire pressure adjustments.
  - Consumer education.
    - Request cooperation with automotive businesses. Include TIMS resetting as part of the general maintenance experience.
      - Tire shops, brake shops, car dealerships, instant oil change businesses, etc.
    - Advertising campaign.

Bosch Braking Systems
TIMS Presentation to NHTSA

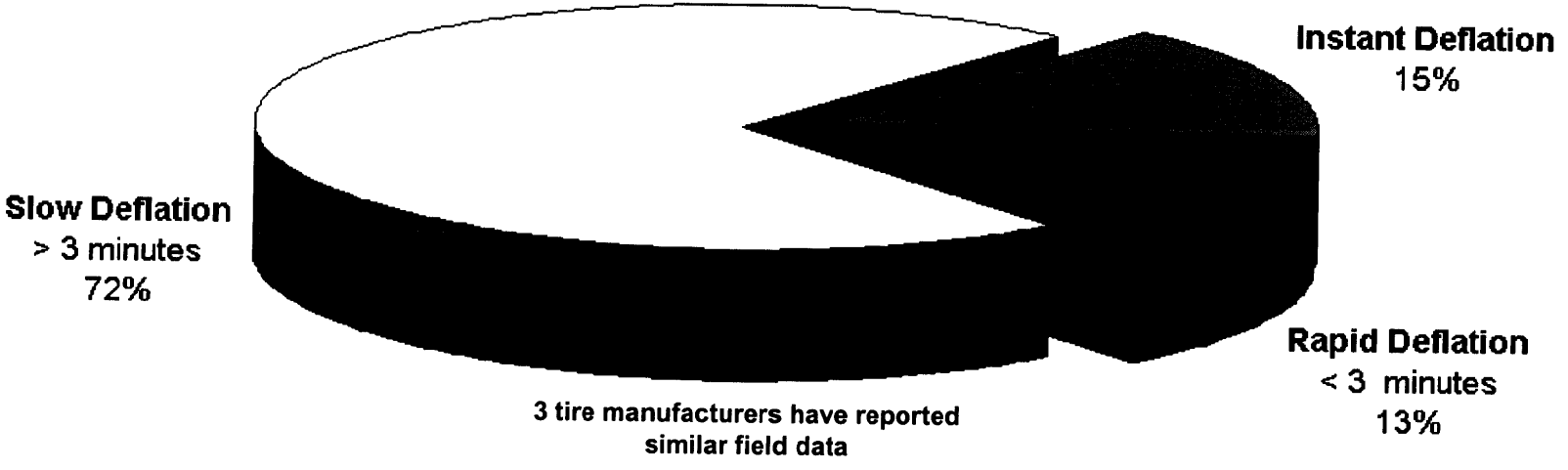
- Compliance Testing Recommendation
  - Compliance tests should represent the majority of US improved roads and highways.
    - Simulate city driving and interstate driving.
    - Simulate hot and cold weather driving.
    - Dry and wet driving.
  - System response times should all be within specification in these scenarios.

  - Not to be included for compliance testing: gravel, sand, snow, ice, "off-road" surfaces, split-traction surfaces.

  - "Nuisance detection" testing should be left to OEMs and suppliers.

Bosch Braking Systems
TIMS Presentation to NHTSA

- Quantifying TIMS Safety Benefits
  - Occurrence of Deflation rates.
    - Single deflations only. No data was available that described the occurrence of multiple deflations.



  - Detections before total deflation: (according to chart)
    - Wheel-speed TIMS: At least 72%
    - Pressure-sensor TIMS: 72% to 85%